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PROCTOR, JASON SCOTT	
ART UNIT	**PAPER NUMBER**
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/914,487	SHKOLNIK, SHLOMO	
	Examiner	Art Unit	
	Jason Proctor	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-26,30-43,45-77 and 79-86* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-26,30-43,45-77 and 79-86* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 23-26, 30-43, 45-77, and 79-86 were rejected in the Office Action of 31 October 2006.

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 28 February 2007 has been entered.

The 28 February 2007 submission has amended claims 23, 45, 50, 72, 82, and 86. Claims 23-26, 30-43, 45-77, and 79-86 are pending in this application.

Claims 23-26, 30-43, 45-77, and 79-86 are rejected.

Response to Arguments – Complete Examination

1. Applicants submit that (emphasis in original):

> Not only did the Examiner fail to perform a complete examination, the Examiner stated on page 14 of the office action that according to 37 CFR 1.111(c), "the application or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made". The Examiner emphasized that the requirement applies to the references cited and not merely to reference applied in rejections.
>
> Applicants respectfully point out to the Examiner that 37 CFR 1.111(c) relates to applications or patents under reexamination and not to all applications.

The Examiner respectfully submits that Applicants' representative's interpretation of this rule is incorrect. The phrase "applications or patents under reexamination" refers to pending applications such as this application, as well as to patents under reexamination.

2. Applicants submit that:

> The Examiner did not perform a complete examination of the application, although MPEP 2143.03 cited by the Examiner in the office action [...] seems to imply he should have.
>
> [...]
>
> In regular applications the burden is on the Examiner to provide a *prima facie* case. This requires comparison of the prior art with the claims *by the Examiner*. Only then must the applicant provide his rebuttal. Not only has the Examiner not provided such a case, he has not even rejected the claims on the art. It appears that the Examiner is seeking to shift his clear burden to the applicant.

It is unclear if Applicants are requesting any action or response with these statements. 37 CFR 1.3 requires that complaints against examiner and other employees must be made in correspondence separate from other papers.

Response to Arguments – Prior Art

3. Applicants' remarks contain the following statements.

> In a quick electronic search in the USPTO web site, applicant found 1079 US patents that use the term "worker" in the claims. (page 14)
>
> Applicant respectfully notes that in an electronic search in issued US patents, applicant found over a thousand patents having the word "substantially" in the claims. (page 14)
>
> Applicant points out that in the USPTO database there are 228 patents that include the word "contemplated" and 13 that include the word "contemplating", in their claims. (page 15)

These statements appear to admit to having performed a search of the prior art. It is unclear which of the above referenced US Patents are known to Applicants' representative as a result of these searches. It is noted, however, the US Patent No. 6,295,513 to Thackston contains the word "substantially" in the claims and may have been discovered during Applicants' representative's search. The Thackston patent has been applied below under 35 U.S.C. § 103 as relevant to the patentability of several claims.

Response to Arguments – 35 USC § 101

4. The previous rejections of claims 45-52 under 35 U.S.C. § 101 are withdrawn in response to the amendments thereto.

Response to Arguments – 35 USC § 112

Claim 23

5. The rejection of claim 23 as failing to comply with the written description requirement is withdrawn in response to the amendments thereto.

6. In response to the previous rejection of claim 23 under 35 U.S.C. § 112, second paragraph, as being indefinite for the use of the (now amended) phrase "providing a plurality of computerized design tools, at least some of which tools store information restricted to viewing by a respective limited group of workers, which workers are assigned to a different system of the vehicle," Applicants argue that:

> The claim was amended to make clear that the workers are assigned to different systems of the vehicle.
>
> Other than that, the Examiner's rejection is unclear and applicant sees nothing wrong with the statement as amended. It describes general practice in the art in which information in design tools are restricted for viewing only to a group of workers. It was included to emphasize that the index is created only with non-confidential information, on the insistence of the Examiner.

The Examiner respectfully traverses this argument as follows.

The phrase "workers are assigned to a different system of the vehicle" renders the scope of the invention vague and indefinite. There appears to be nothing in the claim assigned to a first system of the vehicle, therefore it is impossible to determine that a worker is assigned to a

different (or second) system of the vehicle. For improved clarity, the Examiner has rejected the phrase "a different system" as lacking antecedent basis.

Further, the Examiner is unaware of any insistence referenced by Applicants' arguments.

Applicants' arguments have been fully considered but have been found unpersuasive.

Claim 32

7. In response to the previous rejection of claim 32 under 35 U.S.C. § 112, second paragraph, as being indefinite for the use of the phrase "storing the gathered information ... said information including only a subset of hydraulic design information and said electronic design information," the Examiner emphasized the term "only" (see previous Office Action, page 7). In response, Applicants argue that:

> Applicant respectfully submits that the statement is clear and relates to the fact that only a subset of the hydraulic information and only a subset of the electronic information is included in the stored information and does not state anything on the other design information. This is clear from a simple reading of the claim as well as from the analysis of the Examiner that any other interpretation would contradict the contents of the claim itself.

The Examiner has fully considered this argument and finds it persuasive. The scope of Applicants claim is limited to the clear language of the claim interpreted by a simple reading of the claim. That is, Applicants have claimed, *inter alia*:

> Storing the gathered information in a database having a record for each of the plurality of elements, wherein the database includes information from each of said design tools, said information including ***only*** a subset of hydraulic design information and said electronic design information (emphasis added)

That is, the plain and ordinary meaning of Applicants' claim language excludes mechanical information, structural information, and any other non-hydraulic or non-electronic design

information from the information. The information includes ***only*** a subset of hydraulic design information and a subset of electronic design information.

Applicants' clarification of the claim scope is appreciated. The corresponding rejection of claim 32 has been withdrawn.

8. In response to the previous rejection of claim 32 under 35 U.S.C. § 112, second paragraph, as being indefinite for use of the phrase "disciplines of the vehicle," Applicants argue that:

> The Examiner further stated that the term "disciplines of the vehicle" is vague and indefinite. Applicant refers to the following definition of the term "discipline" at www.dictionary.com:
> "9. a branch of instruction or learning: the disciplines of history and economics."

Applicants do not appear to provide any further explanation.

The Examiner submits that "a branch of instruction or learning of the vehicle" is as indefinite as the phrase "disciplines of the vehicle." The Examiner does not understand the apparent comparison between the term "vehicle" and "history and/or economics". Applicants' arguments have been fully considered but have been found unpersuasive.

9. In response to the previous rejection of claim 32 under 35 U.S.C. § 112, second paragraph, as being indefinite for use of the phrase "sending an electronic message, by the first worker, to a second worker... based on information found in the search," Applicants argue that:

> Applicant does not understand what is unclear. The statement clearly states that the first worker contacts the second worker based on the search. The question of why the worker came up in the search is not a matter of unclarity. The first worker can contact the second worker on any basis, as long as the information found in searching the database is used. Applicant respectfully notes that the second worker is not necessarily the worker in charge of the element, but could be any worker appearing in the database.

The Examiner respectfully traverses this argument as follows.

The claim does not recite contacting a worker who "came up in the search". The claim does not recite contacting a worker wherein "information found in searching the database is used." The claim does not recite that the second worker "is any worker appearing in the database." The claim merely recites the vague and indefinite language "sending an electronic message ... based on information found in the search." The apparent scope of this limitation would include sending any electronic message, for any conceivable reason, to any "second worker," for any reason that is somehow connected to "information in the database".

It appears from Applicants' arguments that Applicants favor a narrower scope of invention than the plain language of the claim defines.

Applicants' arguments have been fully considered but have been found unpersuasive.

10. In response to the rejection of claim 32 under 35 U.S.C. § 112, second paragraph, for use of the term "worker," Applicants state for the record:

Applicants submit that the claim is not distinguished by the use of the word worker.

The Examiner thanks Applicants for this guidance in identifying the metes and bounds of the claim scope. The corresponding rejections have been withdrawn.

Claim 45

11. In response to the previous rejection of claim 45 under 35 U.S.C. § 112, second paragraph, as being indefinite for use of the term "substantially all," Applicants argue primarily that:

> As to the use of the term "substantially all", applicant directs the Examiner to MPEP 2173.05(b) D, which reads: [omitted]

> The use of the term "substantially all" in claim 45 is similar to the use in *Andrew Corp. v. Gabriel Electronics* in which the court stated that one of ordinary skill in the art would know what was meant. In both cases, a clear definition of the standard to be used in determining the extent of the claim (in Andrew corp. – "equal", in the present application – "all the elements of the aircraft that are handled by a plurality of personnel from different departments") is qualified by the term "substantially".
>
> In contrast, the terms in MPEP 2173.05(b) F, such as "of the order of" and "substantial portion" do not provide any standard to be used in determining the degree intended.
>
> Applicant respectfully notes that in an electronic search in issued US patents applicant found over a thousand patents having the word "substantially" in the claims.

The Examiner respectfully traverses this argument as follows.

Upon review of the *Andrew Corp.* case, the language at issue was "substantially equal." The term "substantially" was used to **broaden** the scope of the term "equal" because, in the context of the technology in *Andrew Corp.*, it was impossible to achieve a perfectly "equal" result. Therefore, in *Andrew Corp.*, the phrase "substantially equal" means "equal" in addition to "slightly unequal".

Applicants have consistently argued that the claimed term "substantially all" actually **narrows** the scope of the term "all" and **excludes** the plain meaning of the term "all." Applicants have consistently held that the language "substantially all" is patentably distinct from the phrase "all". For example, Applicants submit on page 16 of the present response:

> [In distinguishing the claimed invention from Van Huben], [t]he paragraph on col. 10, lines 53-65 of Van Huben is more relevant, in that it specifically states and repeats that "The Design Control Repository contains the control information for all components of the design. This includes such things as the names of all the pieces..."

Applicants submit on page 16 of the 21 August 2006 remarks:

> [In distinguishing the claimed invention from the prior art], [t]he prior art presented by the Examiner generates a database which collects all the data of the vehicle. [...] In addition, the prior art that includes all information has not shown an appreciation of the importance for a tool that allows substantially every design worker to get an overview of the entire vehicle and avoid inter-system design problems before they occur or solve them early in the design.

Applicants submit on page 14 of the 30 January 2006 remarks:

> In relating to claim 23, the Examiner stated that Joliffe does not require collecting all information. Applicant respectfully disagree.

> The translators of Jolliffe relate to the entire internal data structures (col. 2, lines 54-56) and "must accurately support the data by providing a superset of all data required" (col. 4, lines 34-39). [...] The fact is that all the data is represented, whether by a short reference to a known standard or by a long description of a non-standard device.

These arguments demonstrate that Applicants' interpretation of the claim language is **directly contrary to *Andrew Corp.***

Further, Applicants have consistently declined to provide any guidance in determining what portion meets the definition of "substantially all". *Andrew Corp.* suggests that 100% clearly falls into this range, however Applicants have consistently refuted this clearly proper interpretation of the claim language.

The Examiner maintains that the phrase "substantially all" as used in the claims is indefinite.

Applicants' arguments have been fully considered but have been found unpersuasive.

Claims 77

12. In response to the previous rejection of claim 77 under 35 U.S.C. § 112, second paragraph, as being indefinite for use of the phrase "such that the gathered information does not include sufficient information for at least some of said design tasks for which the computerized design tools are adapted," Applicants argue that:

> The Examiner stated that it is unknown how to assess whether there is insufficient information for design tasks. Applicant respectfully submits that in any case it easy to determine whether there is sufficient information to do a task. In this and all other rejections that the Examiner states that it would be a problem to determine whether the art describes the limitation or not, applicant respectfully submits that this is not a problem of clarity of the claims. The burden is on the Examiner to present a *prima facie* rejection based on the art. It is not a replacement for this to declare a claim as being unclear because the Examiner does not know how to search for the prior art. If the Examine4r has some art for which he believes determination is problematic, the proper procedure would be to cite the art and explain why the Examiner believes that it provides a *prima facie* case of unpatentability.

The Examiner respectfully traverses this argument as follows.

35 U.S.C. § 112, second paragraph, requires that "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." Compliance with 35 U.S.C. § 112 is Applicants' responsibility. Where Applicants' claim language fails to meet this requirement, it may be impossible to compare the claimed invention against the prior art. In that circumstance, it is impossible to properly determine whether the claimed invention is novel or non-obvious.

Applicants deliberate claim language recites, *inter alia*, "a computer configured to gather ... information on fewer than all the elements of the vehicle described by the [tools], such that the gathered information does not include sufficient information for at least some of said design tasks for which the computerized design tools are adapted". The scope of the claimed "information" is indefinite. The claim fails to specify what information is "sufficient" for any of the design tasks. In order to determine the metes and bounds of this claim language, a person must first determine what all of the unspecified design tasks might be, what information is "sufficient" to perform all of those unspecified design tasks, and then determine whether the information that has been gathered is "insufficient" to perform at least one of the unspecified design tasks. The claim language provides no explanation for what information is not gathered.

The Examiner respectfully suggests claim language that defines the information in terms of what is gathered, rather defining the gathered information according to an unspecified design task that cannot be performed because some of the necessary information has not been gathered.

Applicants' arguments have been fully considered but have been found unpersuasive.

Claim 82

13. The previous rejections of claim 82 have been withdrawn in response to the amendments thereto.

Claim 86

14. The previous rejections of claim 86 have been withdrawn in response to the amendments thereto.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims rejected but not specifically mentioned stand rejected by virtue of their dependence.

Independent claim 23 and dependents

15. Claims 23-26, 30-31, 75-76, and 79-81 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 23, the following claim language lacks antecedent basis:

"a different system" in line 4, because there is no "first" system in the claim;

"the vehicle" in line 4;

"the information" in line 9, which ambiguously refers to either "information" in line 3 or "information" in line 5;

"the company" in line 12;

"all the groups of workers" in line 10;

"all of the groups of workers" in line 12.

In claim 23, the phrase "providing a plurality of computerized design tools, at least some of which stores information restricted to viewing by a respective limited group of workers, which workers are assigned to a different system of the vehicle" is vague and indefinite. It is unclear to what the claim refers by stating "a different system of the vehicle".

16. Claim 79 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 79, the phrase "the company" lacks antecedent basis.

17. Claim 81 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 81, the phrase "the company" lacks antecedent basis.

Independent claim 32 and dependents

18. Claims 32-40, 43, and 53-71 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 32, the phrase "the relative assembly" in line 7 lacks antecedent basis.

In claim 32, the phrase "disciplines of the vehicle" is vague and indefinite.

In claim 32, the phrase "sending an electronic message, by the first worker, to a second worker assigned to another system or discipline of the vehicle, based on information found in the search" is vague and indefinite. This scope of this language appears to encompass virtually any "electronic message" between two workers, because the scope of the phrase "based on information found in the search" has no definite boundaries.

Independent claim 45 and dependents

19. Claims 45-49 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 45 recites the phrase "selecting substantially all of the elements" which is a relative term not defined by the claim. Furthermore, Applicants have consistently argued that this language excludes subject matter that teaches "selecting all of the elements" (see above response to arguments, 35 U.S.C. § 112, claim 45). In light of the prosecution history, this claim language appears to be indistinguishable from "selecting a plurality of the elements..."

Clarification regarding the ***definite*** boundaries of the intended claim scope is respectfully requested.

Claim 77

20. Claim 77 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 77 recites the phrase "a computer configured to gather ... information on fewer than all the elements of the vehicle described by the tool, such that the gathered information does not include sufficient information for at least some of said design tasks for which the computerized design tools are adapted" which renders the claim vague and indefinite. This language provides no clear explanation for what information is to be gathered and which is to be omitted.

Claim 82 and dependents

21. Claims 82-85 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 82, the phrase "the vehicle" in line 2 lacks antecedent basis.

In claim 82, the phrase "the one or more major elements" in line 13 lacks antecedent basis.

22. Claim 84 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 84 recites the phrase "wherein generating the database comprises generating a database not including sufficient information to allow performing all the design tasks of the vehicle, which can be performed by the computerized tools" which renders the claim vague and indefinite. This language provides no clear explanation for what information is included in the database.

This claim, as written, is indefinite for broadening the scope of the parent claim 82. Claim 82 requires "generating a database including information on the relationship between elements," while claim 84 encompasses, for example, generating a database including no information.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

23. Claims 23-26, 30-43, and 45-77, and 79-86 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent No. 6,295,513 to Thackston in view of US Patent No. 4,937,768 to Carver et al.

Regarding claim 23, Thackston teaches a method of forming a design index, comprising:

Providing a plurality of computerized design tools (FIG. 15), at least some of which tools stores information restricted to viewing by a respective limited group of workers [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules."* (column 15, lines 7-11)];

Which workers are assigned to a different system of the project [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability engineers, safety engineers, signal processing specialists, production engineers and so on."* (column 2, lines 9-13)];

Gathering, by a computer, from the plurality of computerized design tools, information on elements of the different systems of the project [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D*

solid models, including attributes, for the projects in the NICECAD system 100." (column 15, lines 28-45)];

Wherein the gathering includes retrieving from at least one of the computerized tools information on fewer than all the elements described by the tool [*"Stored working copy part design model data module 892 may be used by designers and analysts as a virtual "scratch pad" for storing part design models. For example, an EAS team member who checks out the current baseline part design model from module 865 may not be permitted to 'check in' that part design model."* (column 15, liens 46-55)];

Storing the information in the index (column 15, lines 28-45);

Opening the index for viewing by workers of all the groups of workers [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their task."* (column 15, lines 15-27)];

Wherein storing the information in the index comprises storing only information which is authorized for viewing by workers of the company from all of the groups of workers [*"Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate. This serves configuration control by limiting access to only those who need it."* (column 15, lines 15-27)].

Thackston does not explicitly teach a "vehicle" example.

Carver teaches a method of designing a vehicle using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing the claimed "vehicle design index," "different system of the vehicle," and "elements of the vehicle" as claimed.

Regarding claim 24, Carver teaches gathering location information of elements of the vehicle [*"The operator selects a portion of the total structure, as for instance the port side fuselage section 204 of FIG. 4."* (column 24, lines 1-2)].

Regarding claim 25, Carver teaches gathering interconnection information of the elements [*"The operator selects a portion of the total structure, as for instance the port side fuselage section 204 of FIG. 4."* (column 24, lines 1-2); *"A stressed skin construction for an*

aircraft relies upon the strength of the outer skin and attached components and not on strength imparted by internal structural members which might traverse or crisscross through the interior of the aircraft." (column 1, lines 49-64)].

Regarding claim 26, Thackston teaches gathering references to documents describing the elements [*"In one embodiment, a design team member may associate a standard (e.g. MIL-STD-5556.8) with a particular graphical entity when creating a part design model. When viewing the design using a CAD tool (e.g., see FIG. 9, module 932) a fabricator team member may see the standard associated with a particular entity that may be 'clicked on' to link to the text of the standard."* (column 16, lines 44-51)].

Regarding claim 30, Carver teaches gathering information on elements of an aircraft [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Regarding claim 31, Thackston teaches gathering information periodically [*"Data backup and archiving processing module 1013 may comprise a module supporting periodic backing up and archiving of data (e.g., see FIG. 2, module 250)."* (column 19, lines 41-43)].

Regarding claim 32, Thackston teaches a method of providing information between workers design a project, comprising:

Providing a plurality of different types of computerized design tools, each having stored therein sufficient information for carrying out a design task of a respective system of the project (FIG. 15);

The tools including at least a hydraulic design tool storing hydraulic design information and an electrical design tool storing electrical design information [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability engineers, safety engineers, signal processing specialists, production engineers and so on."* (column 2, lines 9-13); *"Quick HDL or Autologic HDL™ from Mentor Graphics Corp."* (column 22, lines 22-49); *"Fluid dynamics analysis processing module 1510 may use numerical techniques to evaluate performance of a part design in a fluid environment, and may include measurement of such parameters as pressure, temperature, and density distributions."* (column 26, lines 24-40)];

Thackston teaches gathering, for each of a plurality of elements of the project, information regarding the element, including an indication of the relative assembly of the element [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100."* (column 15, lines 28-45)];

And a reference to a worker in charge of the element [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules."* (column 15, lines 7-11)];

Storing the gathered information in a database having a record for each of the plurality of elements, wherein the database includes information from each of said design tools, said information including only a subset of said hydraulic design information and said electronic design information [*"Databases 210 may store information for a concurrent engineering development project, such as contracts data, engineering data, account data and other project related data..."* (column 11, lines 17-21); Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); Storing "only a subset of hydraulic design information and said electronic design information" merely omits to store any additional information, and does not retain the benefit of storing the additional information];

Opening the database for viewing by workers of a plurality of departments, assigned to different systems or disciplines of the vehicle [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their task."* (column 15, lines 15-27)];

Searching the database, by a first worker assigned to one system or discipline of the vehicle, for information on one or more of the elements, and displaying information relating to the one or more elements; and sending an electronic message, by the first worker, to a second worker assigned to another system or discipline of the vehicle, based on information found in the

search [*"Multimedia communications processing module 978 provides the multimedia communications capability of the system and, as depicted in FIG. 13..."* (column 24, lines 28-43); *"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)].

Thackston does not explicitly teach a "vehicle" example.

Carver teaches a method of designing a vehicle using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art

methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing "plurality of elements of the vehicle," and "elements of the vehicle" as claimed.

Regarding claim 33, Thackston teaches gathering references to documents describing the elements [*"In one embodiment, a design team member may associate a standard (e.g. MIL-STD-5556.8) with a particular graphical entity when creating a part design model. When viewing the design using a CAD tool (e.g., see FIG. 9, module 932) a fabricator team member may see the standard associated with a particular entity that may be 'clicked on' to link to the text of the standard."* (column 16, lines 44-51)].

Regarding claim 34, Carver teaches gathering location information of elements of the vehicle [*"The operator selects a portion of the total structure, as for instance the port side fuselage section 204 of FIG. 4."* (column 24, lines 1-2)].

Regarding claim 35, Carver teaches that indication of the location of the element comprises an indication of the coordinates of the element within the vehicle [*"This is typically achieved in a 3-D graphics software program using X, Y and Z coordinate points as well as appropriate locating vectors where necessary."* (column 19, lines 58-63)].

Regarding claim 36, Carver teaches that the indication of the location of the element comprises an indication of an access door to the element within the vehicle [FIG. 4, reference 154 depicting at least a canopy acting as an access door to the interior of the cockpit.].

Regarding claim 37, Carver teaches that the indication of the location of the element comprises an indication of a compartment in which the element is located [*"From this major structural component, i.e. section 204, the operator taking advantage of the lofting lines and other design data in the data model selects a particular component part such as a virtual skin panel 206."* (column 24, lines 1-11)].

Regarding claim 38, Thackston teaches that the indication of the relative assembly of the element comprises a list of elements with which the element is connected [*"Assembly simulation module 1516 may use numerical techniques to simulate the assembly process for a part design model to evaluate the producibility thereof."* (column 26, lines 38-40); *"Component interface analysis processing module 1520 may use numerical techniques to evaluate the interface between parts of a part design model, or between the part design model and external items."* (column 26, liens 47-50)].

Regarding claim 39, Thackston teaches that the indication of the relative assembly of the element comprises an indication of a system to which the element belongs [FIG. 15;

Regarding claim 39, Thackston teaches that the indication of the relative assembly of the element comprises an indication of a system to which the element belongs [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their tasks. Likewise, those teams may need to access one or more EAS processing modules to carry out the analysis. Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 8-27)].

Regarding claim 40, Thackston teaches that the indication of the system to which the element belongs comprises an indication of a function of the element within the system [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their tasks. Likewise, those teams may need to access one or more EAS processing modules to carry out the analysis. Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 8-27)].

Regarding claim 41, Thackston teaches running a verification routine which finds design faults on the data contained within the database [*"Motion simulation module 1512 may use*

numerical simulation techniques to evaluate performance of a part design while in motion, such as to determine interference between components or with other objects in the operational environment, and to determine whether pressures and forces are excessive." (column 26, lines 24-40)].

Regarding claim 42, Thackston teaches running a routine which checks for elements which are distanced from each other less than a minimal allowed distance [*"Motion simulation module 1512 may use numerical simulation techniques to evaluate performance of a part design while in motion, such as to determine interference between components or with other objects in the operational environment, and to determine whether pressures and forces are excessive."* (column 26, lines 24-40)].

Regarding claim 43, it would have been obvious in light of Thackston in view of Carver for the database to not include diagrams or drawings [Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); "not including diagrams or drawings" merely omits storing this additional information, and does not retain the benefit of storing the additional information].

Further, claim 43 does not recite a method step, but rather an initial condition. Claim 32 recites "storing the gathered information in a database," and where the "gathered information" includes diagrams or drawings, the resulting database is beyond the scope of claim 43.

Regarding claim 45, Thackston teaches a method of labeling major elements of a project comprising:

Providing a working environment including a plurality of different departments, assigned to perform design tasks of respective different systems [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability engineers, safety engineers, signal processing specialists, production engineers and so on."* (column 2, lines 9-13)];

Selecting substantially all the elements of the project that are handled by a plurality of personnel from different departments, to serve as major elements that represent the project [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100."* (column 15, lines 28-45)];

Determining for each major element a system to which the element belongs [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules. The module may also comprise data determining which teams may acce4ss certain project documents, such as specifications."* (column 15, lines 7-26)];

Assigning each of the major elements with a code which is unique to each occurrence of the element in the project, responsive to the system to which the element belongs [*"In one*

embodiment, the working copies stored in this module by NICECAD server 200 are assigned working copy version numbers. In another embodiment, the working copy version numbers are maintained so that there is a complete history of all working copies of the part design model in the NICECAD system." (column 15, line 66 – column 16, line 4)]; and

Storing records identifying the major elements using the assigned codes in a database [*"In one embodiment, the working copies stored in this module by NICECAD server 200 are assigned working copy version numbers. In another embodiment, the working copy version numbers are maintained so that there is a complete history of all working copies of the part design model in the NICECAD system."* (column 15, line 66 – column 16, line 4)].

Thackston does not explicitly teach an "aircraft" example.

Carver teaches a method of designing a aircraft using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a

"aircraft," thus producing "different systems of the aircraft," and "elements of the aircraft," etc., as claimed.

Regarding claim 46, Thackston teaches that the major elements include elements belonging to the structure [*"Mechanical event simulation module 1514 may use numerical techniques toe valuate a part design model's behavior in response to mechanical events, such as crashes or collisions, and may provide predictions of the extent of deformation, dents and the like."* (column 26, lines 33-37)].

Regarding claims 47-49, these claims appear to define the claimed invention based on the content of printed or otherwise readable text (*"a code having at least three digits,"* etc.). According to MPEP 2112.01 (III), the content of printed matter will not distinguish the claimed product (*"a database"* in claim 45) from the prior art.

Regarding claim 47, Thackston teaches that assigning the code comprises assigning a code having at least three digits in common with digits of a part number of the element, for most of the major elements of the aircraft [*"In one embodiment, this module may contain the entire history of baseline designs, each of which is assigned a version number for tracking purposes (e.g., Design 1.00, 1.01, 1.02, etc.). The latest version number may be the current baseline design."* (column 15, lines 41-45); *"In one embodiment, the working copies stored in this module by NICECAD server 200 are assigned working copy version numbers. In another embodiment, the working copy version numbers are maintained so that there is a complete*

history of all working copies of the part design model in the NICECAD system." (column 15, line 66 – column 16, line 4)].

Regarding claim 48, Thackston teaches that assigning the code comprises assigning a plurality of codes to at least one single element [*"In one embodiment, the working copies stored in this module by NICECAD server 200 are assigned working copy version numbers. In another embodiment, the working copy version numbers are maintained so that there is a complete history of all working copies of the part design model in the NICECAD system."* (column 15, line 66 – column 16, line 4)].

Regarding claim 49, Thackston teaches that the plurality of codes assigned to the at least one single element comprise codes which represent connection ends of the element [*"Component interface analysis processing module 1520 may use numerical techniques to evaluate the interface between parts of a part design model, or between the part design model and external items."* (column 26, lines 47-50)].

Regarding claim 50, Thackston teaches a method of referencing workers working on a project comprising:

Providing a working environment including a plurality of different departments, assigned to perform design tasks of respective different systems [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability*

engineers, safety engineers, signal processing specialists, production engineers and so on." (column 2, lines 9-13)];

Assigning configuration management codes to various systems of the project [*"In one embodiment, this module may contain the entire history of baseline designs, each of which is assigned a version number for tracking purposes (e.g., Design 1.00, 1.01, 1.02, etc.). The latest version number may be the current baseline design."* (column 15, lines 41-45)];

Assigning each part of the aircraft, a part number code which includes the assigned configuration management code of the system to which the part belongs [*"This module (1106) may provide that each version of the baseline part design model is given a version number."* (column 20, lines 20-39);

Generating worker codes which include the configuration management code of the system on which the worker works in designing the project [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules. The module may also comprise data determining which teams may acce4ss certain project documents, such as specifications."* (column 15, lines 7-26)];

Storing records identifying the workers using the assigned codes in a database [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules. The module may also comprise data determining which teams may acce4ss certain project documents, such as specifications."* (column 15, lines 7-26)].

Thackston does not explicitly teach an "aircraft" example.

Carver teaches a method of designing a aircraft using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing "plurality of elements of the aircraft," "different systems of the aircraft," etc., as claimed.

Regarding claim 51, Thackston teaches that the configuration management codes comprise three digits [*"In one embodiment, this module may contain the entire history of baseline designs, each of which is assigned a version number for tracking purposes (e.g., Design 1.00, 1.01, 1.02, etc.). The latest version number may be the current baseline design."* (column 15, lines 41-45)].

Regarding claim 52, Thackston teaches preparing a responsibility matrix which references workers by the assigned worker codes [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their tasks. Likewise, those teams may need to access one or more EAS processing modules to carry out the analysis. Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 8-27)].

Regarding claim 53, Thackston teaches gathering a plurality of different indications of the relative assembly of the element [*"Data backup and archiving processing module 1013 may comprise a module supporting periodic backing up and archiving of data (e.g., see FIG. 2, module 250). This module may also support the resort to backup server hardware and/or software (e.g., see FIG. 2, module 240) when there are system crashes or other interruptions in availability of the primary server hardware and software (e.g., see FIG. 2, module 200)."* (column 19, liens 41-48)].

Regarding claim 54, Thackston teaches gathering at least three levels of a hierarchy of systems and sub-systems to which the major elements belong [*"Component interface analysis processing module 1520 may use numerical techniques to evaluate the interface between parts of*

a part design model, or between the part design model and external items." (column 26, lines 47-50)].

Regarding claim 55, Thackston teaches gathering only for elements which are related to by a plurality of different computerized design tools [Thackston does not disclose gathering information for elements which are related to by non-computerized design tools. Claim 55 presents only a negative limitation.].

Regarding claim 56, Thackston teaches that the indication of the relative assembly comprises an indication in each record of elements which are functionally related to the element described by the record [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their tasks. Likewise, those teams may need to access one or more EAS processing modules to carry out the analysis. Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 8-27)].

Claims 57 and 58 fail to define a method step, but rather describe the storage size of the database. Thackston teaches a database (FIG. 2, reference 210). The claimed change in size is found to be obvious over the prior art. The clear advantage would be to save storage space. See MPEP 2144.04 (IV)

Regarding claim 59, it would have been obvious in light of Thackston in view of Carver to gather information for fewer than 10% of the physical elements of the vehicle, described by the computer design tools. The claim merely specifies the omission of information describing the other 90% of the elements. Omission of an element and its function is obvious if the function or element is not desired. It would have been obvious to omit the information pertaining to the other 90% of the elements to save storage space. See MPEP 2144.04(II)

Regarding claim 60, Thackston teaches that the references to the documents comprise hypertext links [*"In one embodiment, a design team member may associate a standard (e.g. MIL-STD-5556.8) with a particular graphical entity when creating a part design model. When viewing the design using a CAD tool (e.g., see FIG. 9, module 932) a fabricator team member may see the standard associated with a particular entity that may be 'clicked on' to link to the text of the standard."* (column 16, lines 44-51)].

Regarding claim 61, Thackston teaches that the documents comprise references to diagrams including the elements [*"This module may be used by designers to associate particular standards with graphical entities of a part design model."* (column 16, lines 40-51)].

Regarding claim 62, Thackston teaches that the documents comprise references to procurement invoices of the elements [*"GMR graphics server 2710 ... provides for manufacturing vendor engineer and craftsmen (2770) to view the stored part design model..."*

(column 49, lines 46-55); *"Continuing with the ETC aspect of the invention, the RFQ may be submitted or 'posted' to GMR graphics server 2710 via browser templates completed by GMR user 2600. The RFQ may include such information as a project identifier, narrative description, quantity requirements, schedule requirements, delivery requirements, and the like."* (column 50, lines 43-65); also FIG. 21, reference 2250].

Regarding claim 63, Thackston teaches that each of the elements is identified in the database by a unique code which is assigned according to a functionality of the element [*"In one embodiment, this module may contain the entire history of baseline designs, each of which is assigned a version number for tracking purposes (e.g., Design 1.00, 1.01, 1.02, etc.). The latest version number may be the current baseline design."* (column 15, lines 41-45); *"In one embodiment, the working copies stored in this module by NICECAD server 200 are assigned working copy version numbers. In another embodiment, the working copy version numbers are maintained so that there is a complete history of all working copies of the part design model in the NICECAD system."* (column 15, line 66 – column 16, line 4)].

Regarding claim 64, Thackston teaches that gathering the information comprises gathering from at least one computerized tool such that an update of information in the at least one computerized tool automatically updates the database [*"Check-in/check-out controls generally refers to the procedures employed by the NICECAD system to control access to proprietary part design model and specification data... Once the team member completes the task, he/she may have to 'check in' the item by informing the NICECAD system that the task is*

complete. By updating the check-in/check-out data in stored product data and electronic document distribution control data module 855, the NICECAD system provides configuration control by maintaining a history of which teams have accessed which part design models and documents." (column 14, line 52 – column 15, line 3)].

Regarding claim 65, Thackston teaches that changing the content of the index is allowed only through the gathering from the computerized tools [*"Check-in/check out controls"* (column 14, lines 52-55)].

Regarding claim 66, Thackston teaches incorporating output information of at least one data evaluation program into the database [*"In step 1820, the team member launches the analysis or simulation postprocessing software component consistent with authorization, and in step 1822, the team member performs the postprocessing procedures. In step 1824, the team member posts the results to NICECAD server system 200 and updates appropriate PDM documents."* (column 31, lines 56-61)].

Regarding claim 67, Thackston teaches performing a design-to-cost analysis [*"...the mechanical engineer will need to determine if packaging limits are exceeded and the accounting specialists will need to determine if "design to cost" parameters are exceeded."* (column 2, lines 22-35)]. It would have been obvious to include a computerized design-to-cost analysis program with the EAS tools shown in FIG. 15 of Thackston because such a tool would automate the design-to-cost analysis performed manually by accounting specialists in the prior art.

Regarding claim 68, Thackston teaches that the at least one data evaluation program comprises a design-for-manufacture-and-assembly program [*"Modules 1524-1532 are especially relevant to fabricators evaluating producibility of a part design model. Machining process simulation module 1524 may be used to evaluate whether a part design model (or portion thereof) may be manufactured using particular machines. For example, the dimensions of the part design model may be considered to determine which machines may be used and what material stock may be used. Casting simulation module 1526 may be used to determine whether casting processes may be used to produce a part design model. Forging simulation module 1528 may be used to determine whether forging processes may be used to produce a part design model. Sheet metal process simulation module 1530 may be used to evaluate whether the part design model may be made of sheet stock. Other manufacturing simulation modules 1532 refers to any other manufacturing simulations that may be offered by the NICECAD system."* (column 26, lines 53-67)].

Regarding claim 69, Thackston teaches storing on a portable computer [*"Prime contractor user systems 220 may comprise ... portable electronic devices"* (column 9, lines 44-52)].

Regarding claim 70, Thackston teaches that the index is open for viewing by all workers working on the project, while changing the index is allowed only to workers responsible for changing the data of the index [*"For example, an EAS team member who checks out the current*

baseline part design model from module 865 may not be permitted to 'check in' that part design model. This is because it may be that only the prime contractor can authorize writing a baseline part design model to module 865." (column 15, lines 48-53)].

Regarding claim 71, Thackston teaches viewing in the database, by a worker, information on systems of the vehicle other than the worker is responsible for [*"This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)].

Regarding claim 72, Thackston teaches a method of providing information between workers designing a project, comprising:

Providing a working environment including a plurality of different departments, assigned to perform design tasks of respective different vehicle systems [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability engineers, safety engineers, signal processing specialists, production engineers and so on."* (column 2, lines 9-13)];

Selecting a plurality, but fewer than 10% of the physical elements of each system of the vehicle to serve as major elements of the vehicle element [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models,*

such as 3D solid models, including attributes, for the projects in the NICECAD system 100." (column 15, lines 28-45)]; Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); Selecting "a plurality, but fewer than 10% of physical elements" merely omits to select additional elements, and does not retain the benefit of selecting additional elements];

Gathering, for each of a plurality of elements of the project, information regarding the element, including an indication of the relative assembly of the element [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100."* (column 15, lines 28-45)];

And a reference to a worker in charge of the element [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules."* (column 15, lines 7-11)];

Storing the gathered information in a database having a records only for the major elements [*"Databases 210 may store information for a concurrent engineering development project, such as contracts data, engineering data, account data and other project related data..."* (column 11, lines 17-21); Thackston teaches storing information for the selected elements, as claimed. Selecting only the major elements is explained above.];

Searching the database, by a first worker assigned to one system or discipline of the vehicle, for information on one or more of the elements, and displaying information relating to the one or more elements; and sending an electronic message, by the first worker, to a second worker assigned to another system or discipline of the vehicle, based on information found in the search [*"Multimedia communications processing module 978 provides the multimedia communications capability of the system and, as depicted in FIG. 13..."* (column 24, lines 28-43); *"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)].

Thackston does not explicitly teach a "vehicle" example.

Carver teaches a method of designing a vehicle using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model."* (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing "plurality of elements of the vehicle," "different systems or disciplines of the vehicle," and "elements of the vehicle" as claimed.

Regarding claim 73, Thackston teaches gathering at least three levels of a hierarchy of systems and sub-systems to which the major elements belong [*"Component interface analysis processing module 1520 may use numerical techniques to evaluate the interface between parts of a part design model, or between the part design model and external items."* (column 26, lines 47-50)].

Regarding claim 74, it would have been obvious over Thackston in view of Carver to select fewer than 1% of the elements. Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); Selecting "a plurality, but fewer than 1% of physical elements" merely omits selecting additional elements, and does not retain the benefit of selecting additional elements];

Regarding claim 75, Thackston teaches that the index is open for viewing by all workers working on the project, while changing the index is allowed only to workers responsible for changing the data of the index [*"For example, an EAS team member who checks out the current baseline part design model from module 865 may not be permitted to 'check in' that part design model. This is because it may be that only the prime contractor can authorize writing a baseline part design model to module 865."* (column 15, lines 48-53)].

Regarding claim 76, Thackston teaches gathering information on both electrical and mechanical elements (FIG. 15).

Regarding claim 77, Thackston teaches an apparatus for forming a design index, comprising:

A memory for storing the index (FIG. 2, database 210); and

A computer configured to gather, from a plurality of computerized design tools, each of the tools adapted for designing a different system of a project by performing a plurality of design tasks, information on fewer than all the elements of the vehicle described by the tool, such that the gathered information does not include sufficient information for at least some of said design tasks for which the computerized design tools are adapted, and to store the gathered information in the memory (FIG. 2, "NICECAD SERVER SYSTEM 200"; FIG. 15).

Thackston does not explicitly teach a "vehicle" example.

Carver teaches a method of designing a vehicle using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided*

Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model." (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing "a different system of a vehicle," and "a vehicle design index" as claimed.

Regarding claim 79, Thackston teaches that the index is restricted to viewing only by workers of the company [*"... the prime contractor may assign access permissions to part or all of the part design model, project specification, and the EAS processing modules."* (column 14, lines 55-57)].

Regarding claim 80, Thackston teaches initiating communication between workers designing the project using different computerized tools, using information in the index [*"For example, if a design team and EAS team have a multimedia communications session using the*

NICECAD system to discuss certain design issues, a record may be stored reflecting the session." (column 17, lines 34-47)].

Regarding claim 81, Thackston teaches gathering general information authorized for viewing by workers of the company from a plurality of departments on elements having some details restricted to viewing by a limited group of workers [*"... the prime contractor may assign access permissions to part or all of the part design model, project specification, and the EAS processing modules."* (column 14, lines 55-57); *Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 7-27)].

Regarding claim 82, Thackston teaches a method comprising:

Providing computerized design tools of different systems of a project (FIG. 15);

Designing the project by workers using the computerized design tools [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their tasks. Likewise, those teams may need to access one or more EAS processing modules to carry out the analysis. Stored design and analysis access permission data module 860 allows an approval authority to assign access permissions to limit access to those portions of the part design module, those specifications (or portions thereof), and those EAS processing modules as appropriate."* (column 15, lines 8-27)].

Generating a database including information on the relationship between elements of the project from different systems, but including information on fewer than all the elements of the project [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100."* (column 15, lines 28-45)]; Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); Storing "information on fewer than all the elements" merely omits to store additional information, and does not retain the benefit of storing additional information];

Opening the database for viewing by workers of a plurality of departments, assigned to different systems of the project [*"Multimedia communications processing module 978 provides the multimedia communications capability of the system and, as depicted in FIG. 13..."* (column 24, lines 28-43); *"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)];

Determining from the database, by one of the workers, which elements of systems other than the system to which the worker is assigned, are directly affected by a possible change in an element of the vehicle ["*This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues.*" (columns 24, line 66 – column 25, line 22)];

And performing at least one of displaying information relating to the one or more major elements and sending an electronic message to workers in charge of the elements determined to be affected by the change, to discuss the possible change [*"Multimedia communications processing module 978 provides the multimedia communications capability of the system and, as depicted in FIG. 13..."* (column 24, lines 28-43); *"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)].

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Carver teaches a method of designing a vehicle using CAD [*"A 3-D CAD program or programs, such as CATIA (IBM Corporation) or NCAD and NCAL (Northrop Computer Aided Design and Northrop Computer Aided Lofting, Northrop Corporation, Hawthorne, Calif.) would*

be suitable to define the master engineering definition of the aircraft 154 in 3-D graphics in the data model." (column 22, lines 48-54)].

Carver and Thackston are analogous art because both are drawn to CAD.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Carver with Thackston as expressly motivated by Carver to precisely produce aircraft [*"This invention provides for new and improved methods and apparatus for precisely producing and assembling a multi-copmonent structure such as an aircraft."* (column 6, lines 62-64)] without the disadvantages of prior art methods (columns 1-6). The combination could replace Thackston's "sonobuoy" example with a "vehicle," thus producing "a different system of a vehicle," and "a vehicle design index" as claimed.

Regarding claim 83, it would have been obvious over Thackston in view of Carver to include less than 10% of the elements. Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); including "less than 10% of the elements of the vehicle" merely omits including additional elements, and does not retain the benefit of including additional elements];

Regarding claim 84, it would have been obvious over Thackston in view of Carver to generate a database not including sufficient information to allow performing all the design tasks of the vehicle, which can be performed by the computerized tools [This claim apparently

encompasses a database storing no information, or omitting some information. Please see MPEP 2144.04(II) as explained above in regard to claim 83.]

Regarding claim 85, Thackston teaches determining the identities of the contacted workers from the database [*"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues."* (columns 24, line 66 – column 25, line 22)].

Regarding claim 86, Thackston teaches a method of providing information between workers designing a project, comprising:

Providing a working environment including a plurality of different departments, assigned to perform design tasks of respective different vehicle systems or disciplines [*"In our sonobuoy example, there will be mechanical engineers, electrical engineers, RF engineers, acoustic specialists, reliability engineers, safety engineers, signal processing specialists, production engineers and so on."* (column 2, lines 9-13)];

Selecting fewer than 10% of the physical elements of each of the systems of the project to serve as major elements of the project [*"Stored baseline part design model data module 865 may*

contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100." (column 15, lines 28-45)]; Omission of an element and its function is obvious is the function of the element is not desired – MPEP 2144.04 (II); Selecting "fewer than 10% of physical elements" merely omits to select additional elements, and does not retain the benefit of selecting additional elements];

Gathering, for each of the major elements of the project, information regarding the element, including an indication of the relative assembly of the element [*"Stored baseline part design model data module 865 may contain the current approved version of the design referred to as the 'baseline.' ... A part design model may be created using the NICECAD CAD capability... In general, stored baseline part design model data module 865 may contain the part design models, such as 3D solid models, including attributes, for the projects in the NICECAD system 100."* (column 15, lines 28-45)];

And a reference to a worker in charge of the element [*"Stored design and analysis access permission data module 860 may comprise data assigned by the prime contractor determining which teams (or team members) may access the part design model, documents and EAS processing modules."* (column 15, lines 7-11)];

Storing the gathered information in a database having a records only for the major elements [*"Databases 210 may store information for a concurrent engineering development project, such as contracts data, engineering data, account data and other project related*

data..." (column 11, lines 17-21); Thackston teaches storing information for the selected elements, as claimed. Selecting only the major elements is explained above.];

Managing in the database, for each selected element, an action item list including listings of at least one of actions related to the element which need to be performed or which were performed [*"In another embodiment, the working copy version numbers are maintained so that there is a complete history of all working copies of the part design model in the NICECAD system."* (column 16, lines 1-4)];

Opening the database for viewing by workers of a plurality of departments, assigned to different systems or disciplines of the project [*"Teams, such as EAS teams, may need access to all or part of a part design model in order to carry out the analysis for their specific discipline. They may need to access specifications or other documents to perform their task."* (column 15, lines 15-27)];

And contacting a worker in charge of the element based on information found in the search, and discussing with the contacted worker the proposed change [*"Multimedia communications processing module 978 provides the multimedia communications capability of the system and, as depicted in FIG. 13..."* (column 24, lines 28-43); *"Quasi-real time graphics processing module 1306 is a module that may permit participants in an on-line communications session to view graphics, such as a 3D part design model or 2D section cuts, rotations, fly-throughs, zooms or pans in a substantially concurrent manner... This would allow, for example, one design team member to engage in the design effort with another remotely located design team member. This would allow, for example, a design team member to interact with a remotely*

located fabricator team member to view sectional cuts at the same time in order to discuss producibility issues." (columns 24, line 66 – column 25, line 22)].

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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